

**NEAR-DROWNING AND THE UNRESPONSIVE
DIVER:
RESCUE TRAINING FOR RECREATIONAL
SCUBA DIVERS**

Drew Richardson

Key Words

Near-drowning, rescue, training, unconscious

Introduction

This is an overview of the procedures required for rescuing near-drowned scuba divers and the training recommended. The paper includes definition and causes, four general procedures for in-water rescue, two scenarios for rescues and the training required, one for an unresponsive diver underwater and the other for an unresponsive diver at the surface. Also included are variations of in water rescue breathing technique, seven procedures for assistance out of the water and closing philosophical thoughts

Definition

Near drowning occurs when someone revives a diver (or swimmer) who became unresponsive, unconscious, or unable to respond or act coherently, and stopped breathing while submerged. Although a variety of causes may initiate fatal dive accidents, in most instances drowning ultimately causes death. One can define drowning as death caused by asphyxiation (suffocation) in water. When a diver suffers asphyxiation in water but gets revived, we define the accident as near drowning.

In more than 80% of cases, near drowning causes water to enter the patient's lungs. This interferes with the body's ability to transport oxygen even if the patient is breathing, resulting in hypoxia or insufficient oxygen reaching the tissues.

With near drowning, the most common immediate symptom will be that the patient is not breathing. Therefore, the primary first aid for near drowning is immediate rescue breathing. Be alert for vomiting, especially as the patient resumes breathing on his own. Be prepared to turn the patient and keep the airway clear. Symptoms also include coughing, shortness of breath, blueness of lips (cyanosis), frothy sputum and cardiac arrest. If the patient breathes sporadically, administer oxygen. Treat the patient for shock and contact the Emergency Medical Service.

Although in most instances brain damage occurs in as little as four to six minutes without oxygen, for reasons not completely understood, immersion (especially in cold water) can make revival possible even after fairly long

periods. Therefore, begin emergency care immediately, even if the victim has been submerged longer than four to six minutes.

A revived near drowning patient may quickly seem fully recovered. Nonetheless, the patient should always go to a hospital as soon as possible. Physiological complications caused by inhaled water can occur five to six hours after the accident; untreated these complications may be fatal. Proper medical care can prevent this.

Possible causes of near drowning

Near Drowning may be caused by swallowing water, extreme fatigue, entanglement and lung over pressurisation, panic, inefficient breathing, throat blockage, exhaustion, cardiac arrest and unconsciousness.

In-water Rescue

The essentials of in water rescue are:

- 1 Quickly bring the diver to the surface and check for breathing.
- 2 Establish ample positive buoyancy for rescuer and victim.
- 3 Signal for assistance, provide rescue breathing as needed.
- 4 Remove the diver from the water.

Unresponsive underwater

If the regulator is in the victim's mouth, hold it in place from behind even if the victim is not breathing. This may help keep water out of the victim's lungs, provide air if the victim resumes breathing during ascent and will not interfere with expanding air escaping from the victim during ascent.

If the regulator is out of the victim's mouth, do not waste time putting it back in; expanding air will vent itself and may prevent water from entering their lungs.

For the best control, use your own buoyancy compensating device (BCD) to ascend with the victim. Hold the victim from behind and begin your ascent, venting air from your BCD as necessary to maintain a safe rate. If possible, do not drop the victim's weights or inflate his BCD until you reach the surface. This makes it easier to control the ascent. Keep the victim's head in a normal position. Expanding air will vent by itself.

If releasing air from your BCD does not control the ascent, you may need to release air from the victim's BCD. You can also flare out to reduce ascent speed. If you cannot keep the ascent under control, allow the victim to ascend

separately. Ascend at a safe rate and regain contact with the victim at the surface. When you reach the surface with an unresponsive diver, call for help as you ditch weights, establish buoyancy and turn the victim face up.

Unresponsive at the surface

If you find an unresponsive diver floating, call to the diver to check responsiveness as you approach. As soon as you determine that the diver needs rescue, call for help, if available, and follow these general procedures below.

General procedures

Drop the victim's weights, establish positive buoyancy, turn the victim face up, remove mask and regulator, position the head to open airway, look for chest movement, listen for breathing, feel for a pulse. If the victim is not breathing initiate rescue breathing. Assess towing/removal considerations based on the situation.

In-water rescue breathing techniques

There are several alternatives available to the rescuer to initiate in-water rescue breathing which include:

- Mouth to pocket mask,
- Mouth to mouth and
- Mouth to snorkel.

Assistance out of the water

Once you have the victim ashore or on board and secure, perform a primary assessment and follow these seven general procedures:

- 1 Keep the airway open and check for breathing. If necessary, start and continue rescue breathing and/or cardiopulmonary resuscitation (CPR).
- 2 Observe the diver constantly, checking breathing and pulse.
- 3 If the diver does not require CPR or rescue breathing, keep the diver lying level on their side, supporting the head (the recovery position). Do not let this position interfere with transportation or other aid. It should not be used if CPR is required.
- 4 Administer emergency oxygen if possible.
- 5 Keep the diver still and attempt to maintain a normal body temperature by protecting the diver from heat or cold.
- 6 Seek emergency medical assistance.
- 7 If unable to accompany the diver to medical treatment, write down as much background information as possible and attach it to the diver in a conspicuous place.

Closing philosophical thoughts

As a rescuer, do the best you can with the resources you have under the circumstances. All you can do is give the victim or patient a better chance, not certainty, for a more favourable ending. Realise that even if your efforts, in the end, made no difference to the outcome, they still made a difference in that they improved what chances the victim/ or patient had.

AUDIENCE PARTICIPATION

Chris Acott

I think that perhaps in the next couple of years in South Australia buddy diving may be looked at very carefully. I say this because I am involved in a law suit where a diver is suing her buddy and the people who took her out diving. I suppose what the court will be looking at will be the responsibility or duty of care of a buddy in a diving situation, which may be quite interesting.

Guy Williams

I would be interested in Drew Richardson's opinion of such ideas as mandatory regulator servicing and BCD servicing and actually training divers to use redundant systems.

Drew Richardson

I think that training is key. Some of those recommendations, without training people to cope with the more complicated tasks, are going to give a negative result. Just adding a tank here and there is not going to do anything except probably put people in harms way. The technical community is already going down the pathway of totally redundant systems. Your full face mask recommendation has not been something that they have picked up because they cannot do gas switches. However there is at least one manufacturer who is producing a full face mask.

The mandate for the dive industry is to service divers. I think a lot of operators right now, if a tank comes in empty, are going to open it up and look in it, because first of all there is a workplace health and safety issue. There have been cases where an employee was injured in a tank explosion. So if a tank is empty, quite typically they are going to crack the valve and do a visual inspection. To tell the diver that is going to cost them extra, may be part of the individual store's protocol, or it may just be wrapped into their service. I do not think people are going to be dissuaded from running out of air by that.

Out of air is an on-going, long-standing problem which we try to solve that in the beginner training schemes. I am not sure it is an increasing problem. Even at this conference I have seen people run out of air. It is a Darwinian result as there is a task loading. Some people do not survive well and others do. There are a lot of reasons for running

out of air, but response training does not necessarily have to be more formalised. This conference is an on-going training experience. On day one people were sorting out the cobwebs. By now they are more into an automatic process of getting their kit together and they know the reefs a little bit more, the lay of the current, etc. I think that can happen within a peer community as well, not necessarily in a formalised academic environment although we certainly would encourage that.

We have found for the last 30 years that about 30% of divers actually go forward beyond entry level to undertake higher diving certification. That is pretty consistent even though we promoted quite heavily to look after these interests it does not seem to be budging off of about 30% of the divers and I am not sure what to do about that. On the upside the DAN database, just recently reported, have demonstrated a downward curve in annual fatalities. However, there still are fatalities globally. Unfortunately there always will be. Our goal as educators certainly is to try to eliminate deaths and it is encouraging at least to see that the curve is not going up or spiking. It is clearly a downward trend.

On the buddy diving, solo diving arguments, I think we have to be cautious about throwing the baby out with the bath water. It depends how you interpret buddy diving. There are a lot of pragmatic benefits of course. Just dry suit zippers and things like that, which unless you are a contortionist, there is no way on God's green earth you are going to be able to suit yourself up properly. With the assistance of DAN's research department I have recently looked at the number of fatalities in the last 10 years for divers, either solo diving or diving alone. We found about 538 cases. They may have ended up alone, not intended to go solo diving. Our position is that we will continue to advocate buddy diving in the training scenario for all the long standing benefits. Solo diving has a place, but it should not be a one off thing.

If you are going to solo dive, then I think you have to involve yourself in redundant systems. Make a mental effort, not just disappear off the boat by yourself down to 50 or 60 m and hope that it all works out well because when things go wrong, you have a lot of options taken away from you when you are by yourself. Then there is the intangible option which might not have to do with training or anything to do with equipment and that is another human brain there with you when you are focused on something. That brain might just intervene in an error chain in a very benign point, then no one would ever think the more or the less of it. So you could argue hypothetically if you break error chains early you can have positive outcomes, they might not even be noticed.

Looking at the solo diving argument from a legal point of view, we have had a few cases in the US, which I am sure will stun everybody here, where buddies have sued

one another. Shocking for our culture but I think people have realised that more and more in the UK and from what I see from Australia, the lawyers are advertising their services. It might be frivolous but people can bring suit for anything at any given time. I do not think that should run us off inherently safe protocols that have been well established for a number of years.

There have been buddy systems that have broken down and double deaths as well. There is no question of that, but by and large, the safety aspects, at least in the initial training seem to be worth preserving. And I think you asked something on emergency ascent training. A few years ago I presented the various options. They depend on your depth. We do not ask divers to look around endlessly for their buddy to get a bit of air or whatever in 10 m or less. If they are not close enough then divers are trained to do a controlled emergency swimming ascent to the surface. The deeper you get the trickier it becomes whether it has a positive outcome or not. And of course we heavily advocate the use of alternative air sources whether that be an octopus or some of the other things that you described.

Guy Williams

A supplementary question. In my part of the world if you go out on some of the dive charter boats and say "I want to dive the 110 foot sub" they will say "Where is your pony bottle?". If you do not have one they will say "Here we will rent you this, stick it on the back of your tank" and explain how to use it in a very limited way. It might only apply to my part of the world, whether that sort of training should be included in the basic open water course so people have seen it and know what it is before it is thrust upon them.

Drew Richardson

It is included, but there is no motor skill practice. They know these things exist, Spare Air, pony bottles, those are all covered in all the academic preparation so that there is exposure. Whether or not there is actual motor skill practice is left to the instructor.

Reference

Richardson D. *Rescue Diver Manual*. Rancho Santa Margarita, California: International PADI Inc., 1999

Drew Richardson is Senior Vice-President, Training, Education, Environment and Memberships of PADI Worldwide and President, Diving Science and Technology, Inc. His address is PADI International, 30151 Tomas Street, Rancho Santa Margarita, California 92688-2125, USA. Phone + 1-949-858-7234. Fax + 1-949-858-9220. E-mail <drewr@padi.com>.